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ARS 22-18
November 1955

EFFECTS OF THE MARCH 1955 FREEZE ON PEACH, PECAN, AND TUNG TREES IN THE SOUTH

Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

Agriculture - Washington

SUMMARY

Peach, pecan, and tung trees were extensively damaged in March 1955 when the most severe late spring freeze since 1894 struck the South. The cold wave found the trees well advanced into the growing season because of the unseasonably warm weather that had prevailed since mid-February.

Because of the infrequency of such a disastrous freeze (only four in the past 127 years), little experience or information was available to growers for dealing with the consequences.

This report summarizes the observations of ARS scientists on the 1955 freeze and on the subsequent recovery of the trees. Based on these observations, the scientists suggest:

> Avoid hasty pruning, bulldozing, or other radical measures after such an intense freeze. Many badly stricken trees will recover.

Peach trees looked the worst 10 days after the freeze. Then many that seemed critically injured began to recover. Pecan trees did not show signs of recovery until mid-April. Even slightly damaged tung trees did not begin to recover until late April, and many badly damaged trees appeared dead until May.

The effects of the four severe freezes in the past 127 years (1955, 1894, 1849, and 1828) are summarized in table form.

Information in this report was provided by the Horticultural Crops

Research Branch, Agricultural Research Service

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The South has a saying that when pecan trees leaf out, summer is here. But in 1955 summer was set back in late March by a freakish cold wave of history-making proportions.

The cold wave left damaged crops all over the South. It wrecked expectations for a good year with peaches, pecans, tung, and other advanced crops. More serious for the future, valuable trees were injured.

Orchard growers who sought to salvage partial crops, and particularly tree investments, asked in the main these questions:

--As emergency care after the freeze, should trees be pruned?... fertilized?... cultivated?

--What management later is best for tree recovery?

--In the future, how can trees be protected against such treacherous weather?

Horticulturists gave emergency counsel, but expressed a need for more facts from recorded observations and experiments as a basis for recommendations.

A major spring freeze like that of March 1955 has been a rare problem for the South--occurring three times in the nineteenth century and once, so far, in the twentieth. After one of these freezes, oldtimers have been able to recall only one experience like it. For the last such freeze prior to 1955, it is necessary to look back 61 years.

Following the 1955 freeze, considerable effort has been made by ARS scientists to observe and record facts that may help to guide growers of peaches, pecans, and tung now and in the future. At the U.S. Horticultural Field Laboratory at Fort Valley, Ga., a few experiments with aftercare of peaches have been conducted.

The present report, as of September 1955, gives:

--A summary of 1955 freeze developments, with a table showing minimum temperatures at a number of locations.

--Sections on damage to peaches, pecans, and tung, including a detailed record on weather conditions and peach damage in the Fort Valley area.

--A chart comparing the freezes of 1955, 1894, 1849, and 1828, material apparently not heretofore compiled.

Final summarization of losses and other consequences of the 1955 freeze may not be possible for several years. One marked characteristic of pecan and tung trees damaged by the cold has been the unexpected changes in their recovery or decline. This interim report is presented as background for those to whom growers turn for counsel.

CHRONOLOGY OF THE MARCH 1955 FREEZE

Fall and winter before the freeze

Rainfall was below normal through much of the South in the fall of 1954. In September and October temperatures were above normal. In November this trend changed, with both maximum and minimum ranging below normal for the month. December temperatures continued below normal. This cold prevailed into February without interruption by an extended warm period that frequently occurs in southern winters.

The long unbroken period of below-normal temperatures enabled such crops as peaches, pecans, and tung to accumulate relatively early the hours of chilling needed to fulfill their rest requirements. By February 15, in most parts of the South, flower and leaf buds were ready to break dormancy. Then the weather changed. The last 2 weeks of February were unseasonably warm. This weather continued and March was unusually warm--until the freeze struck.

The freeze

Cold from the Arctic reached the South in two installments. The first, on March 22-23, caused light frost damage as far as northern Florida. The weather moderated. Then a frigid air mass with wind from the west and northwest--called by some a blizzard without snow--began moving into the South on March 25.

By March 26 and 27 subfreezing temperatures were recorded in most areas of the South. The lowest temperature was reached in the early morning of March 26 in such locations as Little Rock, Ark., most of Texas, Shreveport, La., and Memphis, Tenn. In areas farther to the southeast, the minimum occurred on March 27. Some locations had freezing temperatures on five successive nights, and in a number of locations temperature records were broken. Minimum temperatures at a number of locations for March 25-30 are shown in Table 1.

Weather aftermath

The cold subsided gradually. The first few days of April were cool, followed by a return to normal warmth. Since then the weather in the South has in general favored recovery, although some localities would have been benefited by more rain.

Table 1.--Minimum temperatures March 25 30, 1955, at designated locations[*]

State and station	March 25	March 26	March 27	March 28	March 29	March 30
		Minimum temperatures, °F.				
Alabama						
Birmingham	44	22	18	30	25	28
Clanton	35	30	18	21	27	28
Fairhope	44	41	26	38	33	42
Lockhart	48	40	24	34	30	37
Montgomery	46	27	21	35	30	32
Arkansas						
Little Rock	24	19	21	30	30	38
Nashville	41	18	16	20	26	35
Florida						
Gainesville	56	62	33	37	33	41
Monticello	52	61	28	32	30	35
Panama City	59	49	29	33	31	40
Quincy	49	51	27	33	31	34
Georgia						
Albany	51	45	23	34	27	31
Atlanta	46	21	16	31	32	36
Augusta	38	29	22	27	24	28
Fort Valley	45	26	19	33	30	36
Griffin	51	33	16	31	30	33
Monticello	56	30	17	26	22	22
Louisiana						
Bastrop	58	25	25	31	31	39
Bogalusa	48	36	27	28	29	30
De Ridder	55	29	28	36	31	35
Ruston	53	24	23	25	30	40
Shreveport	32	25	27	31	33	39
Mississippi						
Jackson	38	25	23	36	31	38
Meridian	44	28	24	36	34	42
Poplarville	55	34	26	37	34	41
Pascagoula	59	37	27	41	35	44
North Carolina						
Hamlet	46	45	19	25	32	30
Jackson Springs	42	54	18	23	31	31
Raleigh	45	24	20	24	32	31
South Carolina						
Clemson College	39	35	15	22	26	27
Columbia	40	28	23	29	26	26
Spartanburg	45	21	18	28	35	32
Tennessee						
Memphis	27	18	22	27	28	36
Nashville	28	17	16	23	26	29
Tullahoma	41	18	13	21	27	25
Texas						
Jacksonville	37	19	25	26	32	33
Stephenville	44	19	20	26	27	42
Tyler	47	22	24	24	26	33
Beaumont	53	32	30	33	33	36

[*] Source: U. S. Weather Bureau

PEACHES

The pre-freeze prospect

Having the necessary cold hours (at 45° F. or below) to break their dormancy by February 15, peach trees responded to the warmth that set in then by developing flower and leaf buds rapidly. Prospects were good for a heavy set of fruit: There had been a heavy bud set, the necessary cold hours had been accumulated, and favorable weather prevailed until the bloom period. By the first week in March most varieties were in full bloom in areas such as central and southern Georgia and Alabama. By March 25, peach trees were in the full bloom to shuck-off stage throughout the peach section of the South. New shoot growth in some instances was 6 to 8 inches long.

Peach damage appraised

The frost on March 22-23 caused some damage to young fruit and flowers in scattered areas. But it was the cold of March 26 and 27 that wiped out the peach crop--generally estimated at 15 million bushels--from central Virginia south and west to central Texas.

The extent of injury to peach trees of all ages was very uncertain immediately after the freeze. By the end of the following September tree loss appeared to be limited primarily to trees planted during the winter of 1954-55, and secondarily to trees that had been in orchards 1 or 2 years. In addition, some older trees that were already weakened from other causes may have been further damaged.

Trees set in winter of 1954-55

While loss of newly-set peach trees ran high, the number killed appears to be smaller than growers at first expected. Damage to these youngest trees varied widely, not only from area to area, but from orchard to orchard. For example, in the neighborhood of Fort Valley, Ga., some orchards lost as few as 1 percent of their newly-set trees, whereas others lost all or so many that the entire group must be replanted. Trees in the cooler locations of the South, though exposed to lower temperatures on March 26 and 27, were injured less severely than trees in warmer areas, which had made more growth.

In general, the more advanced the seasonal growth or the more new growth the newly-set trees had attained, the more susceptible they were to the freeze. While this growth was primarily influenced by the weather, certain other factors partly explain variability.

--Trees planted early in the fall and winter and especially those debudded after growth had started were usually more seriously injured.

--Trees pruned back when planted or afterward were more severely injured than trees left unpruned.

--Any other practice that promoted rapid shoot development seems to have made young trees more susceptible to cold injury.

--Trees in orchards exposed to northwest wind were more severely damaged than those in orchards somewhat protected.

1- and 2-year-old trees

In some areas the 1- and 2-year-old peach trees showed considerable killing back at the previous year's pruning wounds. This was particularly true in orchards directly exposed to the northwest wind. Only a small percentage of trees of this age group have died, and it appears that most of the remainer will recover. Their current season's growth showed considerable injury, but in general trees of these ages have made rapid recovery.

Trees 3 or more years old

Among the trees 3 or more years old, some at all ages showed injury to new wood and new shoot growth that had developed prior to the freeze. Most of the trees seem to have recovered from this injury and have been growing very vigorously. Trees previously weakened by other causes are likely to deteriorate sooner than they would have had the freeze not occurred.

Detailed record from the Fort Valley area

Weather. A rather drastic fall in temperature was experienced at Fort Valley, Ga., on March 26 and 27, as in most other peach sections of the Southeast. At the U.S. Horticultural Field Laboratory at Fort Valley, the temperature on March 26 at 6 a.m. was 60° F. As the day advanced, wind from the northwest steadily increased and the temperature rapidly changed. By 8 p.m. the temperature had dropped to 32° F. At 2-hour intervals, readings were: 10 p.m., 30 °F.; midnight, 26 °F.; March 27, 2 a.m., 23 °F.; 4 a.m., 21 °F.; 6 a.m., 19° F.,; 8 a.m., 24 °F.;10 a.m., 34 °F.

On March 27, the maximum was 51 °F.,and the maximum and minimum on the 28th were 44 °F. and 33 °F., respectfully. A subfreezing 30 °F., on the morning of March 29 followed.

Temperatures rose in the next few days, and a light rain of 0.21 inch fell on April 2. Early April was relatively warm with bright sunshine on most days. Rainfall of 1.04 inches occurred on April 7; 4.76 inches on April 14. From the 14th to the 24th, skies were generally sunny, with temperatures ranging in the upper 80's. The remainder of April was relatively cool. Average temperatures during May were slightly above normal.

Tree damage. In the main, conditions of injury and the course of tree recovery were similar to those for peaches in the general area. In many orchards set during the winter of 1954-55, the young trees appeared completely killed. Their foliage was brown and dead, and all shoot growth was obviously killed back to the trunk. In many cases, the trunk appeared damaged beyond repair. Trees in this critical condition died.

Older trees showed much less foliage injury and very little killing back of the current season's shoots. Shortly after the freeze, there was observed much drying of the new wood and inner-bark of the trunk and scaffold limbs, particularly on the older trees.

Recovery. By April 10, in the Fort Valley area, new growing points were visible on twigs, branches, and scaffold limbs of many trees. However, there was little evidence of recovery or repair in injured wood, except that the cambium area was regaining a little moisture. On April 14 browning of the wood appeared less pronounced, and moisture in the cambium area was more nearly normal.

By April 16 a very thin film of tissue had developed over the discolored wood. This new white tissue developed rapidly, and, in many cases, by April 20 the discolored wood could be seen only by removing the newly formed tissue layer. New shoots put out after the freeze were growing rapidly, and many shoots that had been damaged seemed to be recovering.

By April 29 surviving trees had made remarkable recovery. Trees over 3 years old appeared normal. Trees 1 to 3 years old in most instances were recovering rapidly but still showed signs of damage. Trees set during the winter of 1954-55 varied: Many were dead, but in a number of orchards, newly-set trees appeared in good condition and were making good growth.

Experiments at Fort Valley

In an effort to find some method of speeding recovery of freeze-damaged peach trees, three limited treatments were used experimentally at the Horticultural Field Laboratory. All trees used in the tests had had normal fertilization and cultivation prior to the freeze.

The results of the treatments indicated that (1) applying high rates of nitrogen did not promote more rapid tree recovery; (2) cultivating (disk harrowing) in orchards likewise did not speed recovery; (3) severe pruning seemed to delay rather than hasten recovery.

Recommendations for peach growers

The Fort Valley experiments, along with other observations, seem to indicate that after a freeze of this kind it is best in most instances to do nothing to the trees until the extent of injury can be determined. Peach tree damage looked worst about 10 days after the freeze. In about a month after the freeze, damage could be tentatively appraised.

After this stage, growers can best aid injured peach trees by continuing the same good orchard practices followed in a normal year. Dead branches and dead trees should be removed.

Non-injured trees should be cultivated or otherwise cared for as necessary for satisfactory growth and fruit bud formation for a crop the following year.

If trees have not been fertilized prior to a freeze of this nature, they should be given an application of nitrogen as soon as they show signs of recovery, particularly if they indicate symptoms of nitrogen deficiency.

PECANS

Damage unprecedented

The March freeze in 1955 was the first of its kind experienced by the pecan industry. Pecan trees need considerable warmth--more than peach trees require--to rouse them from winter rest. Since pecans start growth so late, it had been generally assumed that they would never be damaged much by frost in spring.

All varieties of pecans were in some stage of seasonal growth when the March freeze came. Around Meridian, Miss., for example, trees of Moore variety had new shoots 2 or 3 inches long, with catkins and pistillate flowers forming. Schley trees were almost as far advanced. Moneymaker variety had swollen buds, and Success and Stuart had buds starting to swell. Trees with swelling buds lost all chance of a crop.

A large pecan crop had been expected. But the freeze reduced prospects (as estimated by the USDA Crop Reporting Board, September 1955) to a likely 81 million pounds, or about 60 percent of the 10-year 1944-53 average crop. The 1955 estimate is nearly 9 million pounds less than 1954, which was a low-crop year because of drought. Georgia's average crop for the 10-year 1944-53 period was nearly 37 million pounds. In 1955, Georgia expects to harvest only about 4 million pounds, Texas, the other leading pecan-producing State, has fared much better and may have 17, 500, 000 pounds, compared with the 10-year average 1944-53 of 32, 600, 000 pounds.

Damage to pecan trees in different locations varied greatly, influenced by a number of factors. Particularly susceptible to the cold were:

--Trees of early varieties, well advanced in growth. (Slight difference in leafing out time made surprising difference in damage.)

--Trees that were strong and well cared for, and that therefore made an earlier start than weak, neglected trees.

--Trees that produced heavily last year and were temporarily exhausted.

--Trees exposed on the northwest.

Some large plantations in the Albany, Ga., pecan area lost from a third to a half of their young pecan trees--those under 15 years old. This loss was attributed not to the freeze alone, but in part to drought they had already experienced.

Old trees were damaged more than younger trees. In some old trees, branches 8 and 10 years old or even older were injured, and in severely damaged trees tops were usually killed. Many of these stricken pecan trees had browned cambium and darkened wood.

Ups-and-downs of recovery

Recovery signs were evident by mid-April. Some damaged pecan trees were leafing out rapidly from lateral buds on the past season's growth. Catkins were showing well on some trees. A few new shoots bore pistillate flowers, indicating that some nuts might be set. Quickest to start recovery were trees the least advanced in growth when the freeze struck.

Good rains in some localities helped trees with badly injured tops to put out new suckers along scaffold limbs and trunk. These water sprouts aided tree recovery by spreading circulation of sap. When the trees feathered out fairly quickly, new shoot growth appeared also on the more severely injured branches.

By mid-June the recovery picture was clearer. Trees not badly injured looked fairly vigorous. On badly injured trees, large limbs had died, even after putting out new growth. Nuts set on damaged trees were scant, and many of the nuts dropped, probably because shoot growth was weak.

In August, a report from the U.S. Pecan Field Laboratory at Albany, Ga., said that trees were continuing to die and more were likely to be lost as the season advanced, unless growing conditions were highly favorable and an autumn freeze did not cause further damage. In the Albany area, damage to pecans other than the Stuart variety proved more severe than it had appeared in early days after the freeze.

Fate of many pecan trees, especially those that failed to make good top growth, may not be known for another year. Trees with tops killed back are likely to suffer root damage for lack of food material made in the leaves for their growth. Borer populations can thrive and multiply in these nonvigorous dry trees, unhindered by normal sap levels which would drown many borer larvae.

Abnormal flowering has been one consequence of the spring freeze damage to pecans -- a point of interest to horticulturists though it has no important bearing on this year's crop production. Normally the pecan bears pistillate and staminate flowers separately but on the same tree: the pistillate flowers in a raceme at the tip of the current season's shoot and the staminate flowers in catkins. But some of the frost-damaged trees of Desirable and other varieties near Albany, Ga., have produced at the tip of the current shoots mixed racemes bearing both pistillate flowers and staminate catkins.

Recommendations for pecan growers

Following a spring freeze, such as that of March 1955, the best course for pecan growers is to do as little as possible to damaged trees.

Adding fertilizer is not advised until the usual time--in the fall or succeeding spring. Weeds should be kept down by moderate cultivation, mowing, or grazing.

The regular spray program should be followed in pecan orchards that escaped serious freeze damage. Severely damaged trees should be sprayed only if leaf-spot diseases threaten to become serious or insects are likely to cause loss of foliage.

Postpone any pruning until late in the following winter or spring, by which time the extent of the tree's damage will be more evident. By that time, it will be advisable to remove at least the large branches killed by the freeze and to treat the pruning wounds, thus reducing chance of infection by wood-rotting fungi. Pruning pecan trees soon after the 1955 freeze did not aid their recovery, and hasty pruning may have weakened trees. Injured pecans need all possible foliage to make food materials, and to help keep the root system in healthy condition.

TUNG

The susceptible tung crop

In the history of commercial tung growing, no previous spring freeze wrought such crop damage as that on the night of March 26-27, 1955. In much of the Tung Belt, temperatures were the lowest that growers ever experienced so late in spring. In addition, no previous freeze ever caught the trees in so sensitive a stage of spring growth. The unusually warm weather before the freeze had induced rapid development and many trees had already dropped most of their blooms and were loaded with fruit.

Tung trees in midwinter can stand 6° or 8 °F. temperatures without injury. But during active growth, and particularly when fruits are first set, they are highly susceptible to cold. After the 1955 freeze, trees with injured foliage lost practically all their young fruits.

A heavy set of fruit had led growers, before the freeze, to forecast a record-breaking crop--probably 220,000 to 225,000 tons. The freeze wiped out the crop from Tallahassee, Fla., west to Texas. This entire area was left with prospect of harvesting less than one ton of air-dry fruit. East of Tallahassee, where cold was less severe, a partial crop will be produced.

Damage to tung trees

For about 4 weeks after the freeze, many growers feared that almost all tung trees were killed. Acres of trees appeared fatally stricken because young leaves, flowers, and fruits were dead and some trees had injured twigs and branches killed back into 5-year wood. Crotch damage was common.

Wherever older trees were seriously hurt, most of the trees planted in 1954 were killed to the ground or so damaged that they had to be cut back to 6 or 8 inches. (See note on pruning and training, page12.)

Actually, damage varied greatly in different locations, as more general observations and recovery trends have since shown. In any given area the freeze damage to tung decreased from north to south. Very small differences in temperature around the critical point for cold injury made great differences in damage to tung trees. Wind velocity, like the cold, tended to decrease from north to south, and made a difference in damage. Worst injured in any location were trees in exposed places, on north slopes, high ground, and on the fringes of orchards.

Tung tree damage was most extensive in northwestern Florida, parts of Alabama, and in orchards of Mississippi farthest north and east. Most trees in Louisiana tung orchards were not severely damaged.

Tung varieties differed somewhat in resistance to the late spring cold. Seedling trees of McKee and Folsom showed more damage than La Crosse, Isabel, and Lampton. The latter group had passed the peak stage of susceptibility to cold in their seasonal growth. Because the 1955 spring freeze was extraordinary, growers are advised not to lose confidence in a variety that could not stand the freeze well. Resistance of the Folsom variety to autumn cold is much more important than its susceptibility to late spring cold, such as that of 1955.

Recovery trends

Tung trees stricken by the freeze did not begin to recover for about 4 weeks. Dry weather slowed their start. Another delaying factor was extensive destruction of growing points inside terminal buds--from which new shoots ordinarily start.

By late April many trees put out lateral buds near tips of 1954 shoots, and produced good foliage. By June these trees appeared practically normal and gave promise of producing a good crop in 1956, provided weather is favorable.

Although this post-freeze shoot growth had much shortened growing time, and new shoots tended to be short and thin, the flower buds for the 1956 crop had formed normally in most terminals by the end of summer.

Trees with badly damaged tissue in twigs and branches failed to develop lateral buds. These trees did not start growth until May, and some put out only scattered shoots from trunks and large branches.

Tentative appraisals of damage by the end of summer indicate that trees to be rated as total loss will comprise about 7 to 10 percent of tung plantings. Some of these have already died. An additional group estimated at 10 to 15 percent of the tung trees seems likely to yield small crops for the next 3 or 4 years.

Recommendations for tung growers

Emergency care of tung trees following loss of a crop by spring frost was outlined by horticulturists at the U.S. Field Laboratory for Tung Investigations in Bogalusa, La. Measures advised are as follows:

Cultivation. Since frost-damaged trees put out shoot growth late, it is important to keep grass or weeds from competing for moisture in May and June. Plow out the tree rows and disk the row middles; harrow with spring-tooth or disk as required to control competing growth until July (two or three harrowings).

If a winter legume, such as clover, is grown, cultivation should not start until the seed is mature. Cultivation will be needed to renovate the seedbed in the fall.

If competing growth is controlled by shade, little of the described cultivation is needed, but in the 1955 situation, grass started before trees leafed out.

Brushing. Remove brush from all acreage if possible, and certainly that not removed in the preceding 2 years.

Fertilization. Frost-damaged trees require less fertilization than amounts recommended for normal use in orchards bearing a full crop. The following table shows normal-year recommendations, on which to base reduced amounts:

For orchards with a potential production of--	Pounds per acre of Nitrogen (N)	Phosphoric acid (P_2O_5)	Potassium (K_2O)
1 ton per acre	80	40	100
1 to 2 tons per acre	120	60	150
2 or more tons per acre	160	60	200

After spring freeze damage, such as that in 1955--

Nitrogen: Apply 50 percent of the nitrogen that would have been used if trees were bearing a crop, with these exceptions: If good clover or other legumes are grown or trees received the full application the previous year, 33 percent of normal application may suffice. Trees previously starved for nitrogen will require more than 50 percent of the normal amount.

Phosphorus: Omit phosphorus in orchards previously fertilized liberally with this nutrient. Otherwise apply 40 pounds to the acre.

Potassium: Apply about 50 percent of the potassium that would have been used if trees were bearing a crop.

Mixed fertilizer: If mixed fertilizer is used, a 10-5-10 formula is recommended, and the quantity applied should supply the minimum normal requirement for nitrogen.

Note on pruning and training: Many tung trees planted in 1954 were so badly injured that it was advisable to cut them back to 6 or 8 inches. To give them new and well-formed foundation branches, low-heading types were trained to a single stem, like trees newly planted. High-heading varieties, such as La Crosse, would produce undersirably high heads with this treatment. For La Crosse trees planted in 1954 that lost foundation branches, recommended treatment was to train them to vase form by cutting back to a 12- to 30-inch trunk and letting all buds develop.

Because removing dead wood is expensive and rot is not a serious tung problem, pruning older trees has not been recommended. Best procedure is to let the dead wood decay and drop off.

SUMMARY OF FOUR MAJOR SPRING FREEZES IN THE SOUTH*

1. Critical dates - - - - - - -	March 26 and 27, 1955	March 26, 1894	April 16, 1849	April 7, 1828
2. Weather preceding - - - -	Winter continuously cold to mid-February; spring very warm	Winter and spring mild. Earliest peach varieties bloomed in January	Winter exceptionally cold, except at Gulf Coast; spring early and warm	Winter "the mildest ever experienced"; rains in February and March; spring mild
3. The freeze - - - - - - - - -	Light frost, March 22-23; brief moderation; then a cold wave with high wind, March 25-30	Freezing cold with wind; light precipitation	Freezing cold; sleet and snow, heavy in some locations	Freezing cold April 5, 6, 7; "the most severe ever experienced so late"
4. Weather following - - - - -	Some dryness, but favorable in most locations	Some rain; some drought	Rain aided recovery but crops were small	
5. Damage - - - - - - - - - -	Each of these extraordinary freezes caused extensive damage to vegetation, which was well advanced. In 1955, peach, pecan, and tung crops were badly hit, and tree damage considerable. In the nineteenth century freezes these tree crops were not commercially important. Available records stress damage to varied crops such as corn, rye, fruit, in 1894; cotton, in 1849; wheat in 1828.			
6. Experience - - - - - - - -	Avoid hasty measures after one of these rare freezes. In 1955, damage looked worst for peaches about 10 days after the freeze. Later, peach--also pecan and tung--trees made better recovery than at first seemed possible. In 1894, "after the first few days things appeared even worse, if possible, than at the first examination." But by May, recovery was encouraging and fears of vast loss much lessened. In 1828, some farmers plowed up corn and replanted, "but much the best was that which came out from the old roots."			

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*Information on the nineteenth century freezes has been compiled from these sources:

1894: A detailed account by Hugh N. Starnes, horticulturist, in Georgia Experiment Station Press Bulletin 8, May 1894, reprinted as miscellaneous paper by the Station, April 22, 1955.

1849: Issues of the daily Augusta (Georgia) Chronicle and Sentinel of April and May 1849, which contained many exchange dispatches and letters about the freeze from all parts of the South. Comment on the winter of 1849 was made by Lorin Blodget in "Climatology of the United States," published 1857.

1828: A letter printed in the Augusta Chronicle and Sentinel, May 2, 1849, from a planter, R.W. Withers of Milwood, Ala., comparing the freeze in 1849 with that in 1828. For details, he referred to his "common place book" in which he kept crop and weather records in 1827-28.